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The Board's Demography-Firm Performance Relationship Revisited: A Bayesian Approach

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The Board's Demography – Firm Performance Relationship Revisited: A Bayesian Approach

Building on behavioral theory, we argue that the effect of board demography on the performance of small and medium-sized family firms differs significantly at the individual firm level and that the degree by which board task performance meets board task needs explains this effect. Using a Bayesian estimation method, we obtain firm specific estimates of the effect of board demography on firm performance. Analysis of these estimates indicates that the size of the gap between board task needs and board task performance explains the effects of the board demographic characteristics —board size and percentage of family directors— on firm performance.

Introduction

Despite extensive research on formal board structures (Johnson, Daily, and Ellstrand 1996), empirical evidence on the relationship between board demography or composition and firm performance is rather vague and conflicting (Daily, Dalton, and Cannella 2003; Gabrielsson and Huse 2004). In response, several studies argue that the board of directors is a black box, meaning that the internal working of the board is largely unknown and should be viewed as a set of processes and mechanisms that link board composition to firm performance (Forbes and Milliken 1999; Huse 2005; Leblanc and Schwartz 2007).

An approach to opening this black box comprises of the examination of intermediate variables such as board processes and board tasks (Forbes and Milliken 1999; Zahra and Pearce 1989). This stream of literature examines several antecedents of board task performance such as cognitive conflict (Minichilli, Zattoni, and Zona 2009; Minichilli,

Zattoni, Nielsen, and Huse 2012; Zona and Zattoni 2007), effort norms (Minichilli et al. 2012; Zona and Zattoni 2007), background diversity (Minichilli et al. 2009), knowledge and skills (Gabrielsson and Winlund 2000; Minichilli et al. 2012; van Ees, van der Laan, and Postma 2008; Zona and Zattoni 2007), frequency of meetings, board routines (Gabrielsson and Winlund 2000) and commitment (Minichilli et al. 2009). A general conclusion from these studies is that the investigated behavioral variables are more important antecedents of board task performance than board demographic variables.

This study takes a different approach for two reasons. First, one of the main disadvantages of prior board demography-performance studies is the use of traditional statistical methods that provide point or interval estimates based on averages across a sample such as Ordinary Least Squares (OLS). The contradictory evidence on this topic suggests that for each individual firm (or group of firms), the effect between board composition and performance may differ strongly. We take this idea into account by using Bayesian regression analyses which are able to estimate the effect of interest for each firm individually. As such, we are able to specify that the effect of family directors is for 45 percent of the firms in the sample negative and for 55 percent of the firms positive. This finding may explain the contradictory findings of previous studies and justifies the use of a statistical method that estimates a separate parameter for each firm individually (Hansen, Perry, and Reese 2004). Therefore, this paper investigates the effect of two board composition variables —the proportion of family directors and board size— on the performance of small and medium-sized family firms by using a Bayesian analysis that provides the required firm-level estimation.

Second, whereas the majority of prior studies focus on board task performance, this paper argues that focusing on board task needs is equally important (Golden-Biddle and Rao 1997; Huse 2005, 2007). We define board task needs as the firm's need for and expectations of the board to perform certain tasks (Golden-Biddle and Rao 1997; Huse 2005, 2007) in

accordance with the concept of satisficing behavior from behavioral theory (Cyert and March 1963). Understanding board effectiveness and value creation implies simultaneously taking into account board task performance and board task needs which serve as a standard to which boards are accountable (Huse 2005, 2007).

When board task performance satisfies a particular aspiration level, board effectiveness arises which is a necessary behavioral condition under which specific board composition configurations will lead to a higher performance. A “board task gap” emerges when board task performance does not meet the board task needs, which may cloud the board composition-performance relationship. Therefore, in this study we perform a posthoc analysis in which we identify the gap between board task needs and board task performance as an explanatory variable on the strength of the individual firm parameters estimated in the Bayesian analysis. The expectation is that the size of the board task gap relates negatively to the strength (that is, the estimated beta coefficient for each individual firm) of the board composition-performance relationship. Especially in the context of private small and medium-sized family firms it is important to study the board task gap because their board task needs can vary greatly from what general literature regards as important board tasks (Bammens, Voordeckers, and Van Gils 2011; Grundei and Talaulicar 2002). By merely regarding actual board task performance without considering the needs for the different tasks may lead to errors when evaluating board behavior in this type of firms. For example, if a firm’s CEO would indicate that his or her board of directors is not that much involved in building the firm’s organizational reputation, a SME’s board service task identified by previous research (van den Heuvel, Van Gils, and Voordeckers 2006), one could expect the firm to be suffering negative performance consequences from this. However, when the CEO has identified the need for the board to perform this task also as low, for instance because the reputation of this firm is currently excellent, the conclusion regarding the performance effect

is likely false. Consequently, a low performance of the board on a certain task will probably not have a negative effect for the firm when the perceived need for this task is also low. This paper focuses on the service and the control tasks as these have been identified as the two most prominent board tasks in private small and medium-sized family firms (Van den Heuvel et al. 2006; Bammens et al. 2011).

Furthermore, board composition in publicly listed firms may be endogenously determined, (for example, resulting from guidelines in corporate governance codes and legal stipulations) complicating the search for much variation (Sarkar and Sarkar 2009). Since board composition in privately held small and medium-sized firms is usually not the result of endogenous pressures, this population of firms is more apt for analyzing the performance effects of board demography.

The next section holds a discussion of previous research studying the effect of family board members and board size on firm performance. Furthermore, in this section we construct four hypotheses derived from the size of the gap between board task needs and board task performance on the service and the control tasks. The third section presents the methodology used to test the hypotheses, including a description of the sample and variables used. The forth section details the data analysis and results. The paper concludes with a discussion and conclusion.

Literature Review and Theoretical Development

Family Ties in the Board of Directors

In family firms, boards of directors are somewhat special in the sense that family members often make up a significant percentage of total board size. A univocal answer to the question whether family members on the board have a positive or negative effect on firm performance does not yet exist. The trust and cohesiveness among family members is one of the most

important advantages of family firms (Habbershon and Williams 1999). Relationships built on trust could facilitate the cooperation among family directors (Bammens, Voordeckers, and Van Gils 2008). Furthermore, a feeling of cohesiveness in the board could stimulate the directors' efforts to give valuable advice (Huse 2005). Additionally, family members will likely show greater commitment and involvement (Vallejo and Langa 2010) facilitating their access to day-to-day information about what is going on in the firm. This easy access to inside information likely enhances their decision making and facilitates the monitoring of management (Baysinger and Hoskisson 1990; Huse 2005).

On the other hand, when the board largely consists of family members, the risk of having a too homogeneous group (Anderson, Jack, and Dodd 2005) may characterize the board as being deficient in the area of expertise and networks. Furthermore, family directors might be less critical of management decisions (especially when this management consists of relatives) due to altruistic behavior (Schulze, Lubatkin, Dino, and Buchholtz 2001). In addition, appointing outside directors might build more legitimacy for the firm (Johannisson and Huse 2000) and can be a signal of success to the outside world and therefore may be perceived as beneficial for the firm's reputation (Di Pietra, Grambovas, Raonic, and Riccaboni 2008). Family board members probably do not have this advantage.

Family directors might also miss the opportunity to benchmark the firm's strategy with that of other firms since they are usually not members of any other board (Rosenstein and Wyatt 1990). Furthermore, Brenes, Madrigal and Requena (2011) suggest that family firms appoint non-family directors to bring in external knowledge and experience to the business. In conclusion, the evidence on the influence of family directors on firm performance is still inconclusive.

Board Size

Board size is another important and much studied board characteristic that is likely to influence firm performance (Forbes and Milliken 1999). However, extensive research on the relationship between board size and firm performance does not provide a clear answer to the question of whether the effect is positive or negative (Daily et al. 2003). On the one hand, a large number of board members can have a positive effect on firm performance since a large board means more people and skills to serve the firm (Pfeffer 1972). Larger boards are possibly more able to give advice to the management because of the diversity in directors' backgrounds (Dalton, Daily, Johnson, and Ellstrand 1999). Zahra, Neubaum, and Huse (2000) also argue that a larger number of board members in small and medium-sized firms improves the board's ability to provide checks and balances. Furthermore, in small and medium-sized firms, boards often function as links to secure resources such as advice, expertise and networks (Audretsch and Lehmann 2006) which larger boards will be better able to provide than small boards (Huse 2007).

On the other hand, prior studies also point out a series of possible negative effects of a large board. First of all, large boards could slow down the decision-making process (Judge and Zeithaml 1992). Secondly, in terms of organization and coordination, large boards might require a more formalized structure for their meetings which can lower the board's activity level (Forbes and Milliken 1999). Thirdly, a number of group dynamic effects are more likely to occur in large groups. If social loafing takes place, meaning that individuals tend to expend less effort when working in group rather than individually (Latané, Williams, and Harkins 1979), the positive effect of additional board members would decrease.

Furthermore, a board could be sensitive to pluralistic ignorance, a social psychological bias that makes directors underestimate the extent to which other directors share their criticism on the firm's strategy which reduces their willingness to share those concerns (Westphal and Bednar 2005). Even more eminent could be a board in which the bystander

effect plays. This effect implies that the more people are present in case of crisis, the smaller the probability that each person individually will react, the extreme of the effect being that nobody reacts (Darley and Latané 1986). If this effect shows up in a board, board members would not feel the personal responsibility to react to possible severe problems in the firm, which would lower the speed of reporting them.

In summary, the determination of the effect of the board demographic variable board size on firm performance is not straightforward. Contradictory empirical findings also illustrate this conclusion. Bennedsen, Kongsted and Nielsen (2008), for example, find a significant negative effect of board size on firm performance whereas Kiel and Nicholson (2003) find a positive board size effect. The next section, therefore, further investigates the relationships between these board demographic variables —number of family directors and board size— and firm performance by means of looking into the behavior of the board.

The Board's Demography - Firm Performance Relationship Revisited

The literature on family directors and board size points out that the influence of these board demographics on firm performance remains unclear. Previous research studying the board demography-firm performance relationship also acknowledges difficulties in determining the effect (Daily et al. 2003; Gabrielsson and Huse 2004). In response, a number of studies focus their attention on intermediate variables such as board processes and board task variables to increase understanding of the relationship between input (demographic) and output (firm performance) variables.

Gabrielsson and Winlund (2000) find that the working style of the board, measured by board member involvement (that is, knowledge and skills, preparations and commitment and independence) and board structure (that is, formal board routines, formal board evaluation and frequency of meetings), can explain board task performance. They find no direct

relationship between board demographic variables and firm performance. Additionally, Zona and Zattoni (2007) identify board processes, in this case cognitive conflict, effort norms and use of knowledge and skills, as important determinants to explain the performance of the board on the service, monitoring and networking tasks. However, these authors also find a limited influence of board demographics on this board task performance. Van Ees et al. (2008) empirically support the relation between the processes effort norms and use of knowledge on board task performance. Research by Minichilli et al. (2009, 2012) underlines the importance of the board's background diversity, cognitive conflict and commitment in determining the board's performance on its service and control tasks.

However, these empirical studies neglect another important intermediate variable, namely board task needs, which we identify as the firm's need for and expectations of the board to perform certain tasks (based on Golden-Biddle and Rao 1997; Huse 2005, 2007). Looking at actual board task performance alone is not enough; one needs to study this performance taking into consideration the need for the board to perform this task. Wrong conclusions can be drawn by merely regarding if and how well the board performs a number of tasks without considering the firm's need for the board to perform these tasks.

Our arguments are in line with the research by Grundei and Talaulicar (2002), which also points out the importance for the board to comply with the firm's needs. They find that in start-up companies, which are generally characterized by owner-management as well, the board will perform the task that the firm needs, which is not necessarily the task that they are officially obligated to complete. Specifically, they find that firms will respond to the legal obligation to install a supervisory board by redefining its task from monitoring to counsel and liaison because these tasks are needed more in this type of firm.

Including board task needs also finds theoretical support in the behavioral theory concept of satisficing behavior (Cyert and March 1963), which van Ees, Gabrielsson and Huse (2009)

advocate as important when studying boards of directors and corporate governance. Satisficing behavior implies that in general one makes decisions that are good enough based on the current needs, rather than searching for the optimal solution (van Ees et al. 2009). In a firm, the expectation is that the board fulfills certain existing needs. If the board displays behavior that is good enough to satisfy these needs, the firm benefits and the outcome is positive.

Problems only occur when the actual board performance does not match the needs of the firm. Focusing merely on actual board performance is based on the idea that people or groups of people are looking to optimise behavior. Satisficing behavior incorporates needs. Therefore, when studying board behavior, one needs to look at the gap between board task needs and actual board performance. This paper makes a distinction between two important types of board tasks, namely the service and the control task (Forbes and Milliken 1999; Gabrielsson and Winlund 2000). The service task is derived from internal perspectives and signifies the provision of resources such as expertise, social networks and legitimization, to the management team (Huse 2007). The control task is based on external perspectives and indicates the board's task is making sure that management behavior is in the best interest of the firm (van den Heuvel et al. 2006).

This study argues that the *gap* between board task needs and board task performance influences the relationship between board demography and firm performance. This gap identifies the degree to which the firm succeeds in making the board perform in line with what is needed in the firm. To determine the relationship between family directors and firm performance, taking into account this gap for both the service task (the service gap, H1a), and the control task (the control gap, H1b) is necessary.

H1a: The effect of the proportion of family directors on firm performance is negatively related to the size of the service gap.

H1b: The effect of the proportion of family directors on firm performance is negatively related to the size of the control gap.

Furthermore, the effect of the second demographic variable —board size— on firm performance can also be positive as well as negative for each individual firm. Therefore, to evaluate the effect of board size on firm performance one needs to consider the service gap (H2a) and the control gap (H2b).

H2a: The effect of board size on firm performance is negatively related to the size of the service gap.

H2b: The effect of board size on firm performance is negatively related to the size of the control gap.

Methodology

Sample and Data

The empirical data of this paper are derived from a wider survey, executed in 2002. This survey explored the general characteristics as well as management issues, board composition, governance, family features and succession of Belgian private small and medium-sized family businesses. In Belgium, 77 percent of all companies are family firms which account for one-third of the gross national product and employ 45 percent of the workforce (Lambrecht and Molly 2011). The Belgian corporate governance system resembles the Latin

one tier structure (Weimer and Pape 1999). Our sample consists of limited liability companies only (“naamloze vernootschappen”) because these firms are required to establish a board of directors which is important for this study. This type of firms is comparable to C-corporations in the US as these firms also have limited liability protection, must install a board of directors and do not have ownership restrictions. Independent members as well as members of the management can be part of boards of directors in Belgian family SMEs (Weimer and Pape 1999).

All firms in the sample were privately owned and employed at least five people. A survey was mailed to the CEOs of 3,400 firms which were randomly selected from a family-business database. Firms were categorized as family firms when they answered to one of the following descriptions: (1) at least 50 percent of the shares are owned by family members and the family is responsible for the management of the business, (2) at least 50 percent of the shares are owned by family members, the company is not family managed but the CEO perceives the firm as a family business, (3) family ownership is less than 50 percent, the company is family managed, the CEO perceives the firm as a family firm and a venture capital or investment company owns at least 50 percent of the shares. 311 CEOs returned the survey. This response rate is comparable to previous studies that target CEOs of family firms (Bammens et al. 2008; Cruz, Gómez-Meija, and Becerra 2010; Voordeckers, Van Gils, and van den Heuvel 2007). Furthermore, we evaluated potential response bias by contacting a random sample of non-respondents by telephone and requesting data about some key variables such as their firm size, board size, board composition and frequency of board meetings.

Comparing these characteristics of the non-respondents with the respondents from the sample, the conclusion was that the population of Belgian family firms had slightly more rubber stamp boards. That is, the boards of non-respondents were a little smaller, had less

outsider representation and had fewer meetings. However, none of these variables showed significant differences. Because of missing values, the analyses of this study are based on 201 firms. This drop in the number of cases called for a further analysis of the omitted observations.

From this analysis we learned that the omitted firms possessed a paper or rubber-stamp board, meaning that their board was relatively inactive, preventing them from filling in questions about the working of their board. Furthermore, the financial data of this study originates from an external source, Bel-First, which is a financial database gathered by Bureau Van Dijk. As such, the data contains additional information on the number of family directors, board size and firm performance for the period 2000-2003. This is advantageous, since the dependent variable firm performance results from a database external to the survey, hereby mitigating common method bias concerns.

Statistical Approach

We first discuss the statistical approach of this paper as the description of the variables is then easier to follow. The empirical testing of the presented hypotheses involves two stages. In the first stage, a Bayesian analysis estimates the effect of the percentage of family board members on firm performance and the effect of board size on firm performance for each individual firm. As a result, we obtain 201 —which is the number of firms in the sample— estimates for each relationship. The econometric models are as follows.

(1) $\text{Firm Performance}_{i,t} = \beta_0 + \boldsymbol{\beta_{1,i}} (\text{Percentage of Family Directors})_{i,t} + \beta' \text{Controls}_{i,t} + \mu_{i,t}$

(2) $\text{Firm Performance}_{i,t} = \beta_0 + \boldsymbol{\beta_{2,i}} (\text{Board Size})_{i,t} + \beta' \text{Controls}_{i,t} + \mu_{i,t}$

The notation $\beta_{1,i}$ denotes the estimates of the family directors effect and $\beta_{2,i}$ the board size effect on firm performance. The *i* in the subscript of the notations stands for the individual firm effects that are being obtained.

These analyses make use of panel data on board size, the number of family directors and firm performance. Several reasons justify the choice for Bayesian methodology. At present, the literature views family firms as a heterogeneous population (Dyer 2006), which is also apparent from the theoretical development and hypotheses in this paper. By using a Bayesian methodology, the study accounts for this heterogeneity, as one can estimate effects for each firm individually instead of estimating one average effect for all firms, thereby in fact statistically neutralizing all heterogeneity in the sample (Hansen et al. 2004).

Compared to traditional analyses, the relationships that this study wants to test resemble most to a moderating effect. That is, one variable influences the relationship between two other variables. However, this study's approach takes a step further by estimating a relationship, an effect, for each firm individually. Should we use traditional techniques to test a moderating effect, we would estimate this relationship by calculating an average effect for all firms. In practice, we would draw one line through the scatter plot of data points and, consequently, would assume that all firms experience the same effect of a particular variable, thereby losing some of the richness of the data (Perry, Hansen, Reese, and Pesci 2005). Also, the estimation of an average effect of board demographic variables on firm performance has proven to be very difficult, demonstrated by the inconsistency of empirical findings, which makes an estimation of the effects for each firm individually particularly suitable.

Applying a Bayesian methodology has several advantages when taking this firm heterogeneity into account. When calculating firm level effects, the number of parameters that one needs to estimate grows very large with respect to the data points. In addition to the usual number of control estimators and the estimation of the intercept μ_i for each firm, one

now has to estimate the parameter of interest for each firm as well. Added up, if the model includes X control variables, the number of parameters that one needs to estimate increases to (2i + X) for a number of (i x t) observations. When the number of parameters becomes large in relation to the number of data-points, which is known as the problem of ill-positioning, parameters estimated by means of traditional regression techniques such as OLS face the risk of becoming unstable or unreliable because of losses in degrees of freedom (Fraser 2000).

In the second stage these individual firm estimates serve as dependent variables in an ex-post regression. In this way, we can find out whether the service gap and the control gap influence the relationship between the relative number of family directors and firm performance on the one hand and the relationship between board size and firm performance on the other hand, hereby testing our hypotheses. The regression models used at this stage are as follows:

(3) $\boldsymbol{\beta_{1,i}} = \beta_0 + \beta_1 (\text{Service Gap})_i + \beta' \text{Controls}_i + \mu_i$ (H1a)

(4) $\boldsymbol{\beta_{1,i}} = \beta_0 + \beta_1 (\text{Control Gap})_i + \beta' \text{Controls}_i + \mu_i$ (H1b)

(5) $\boldsymbol{\beta_{2,i}} = \beta_0 + \beta_1 (\text{Service Gap})_i + \beta' \text{Controls}_i + \mu_i$ (H2a)

(6) $\boldsymbol{\beta_{2,i}} = \beta_0 + \beta_1 (\text{Control Gap})_i + \beta' \text{Controls}_i + \mu_i$ (H2b)

Measures

Dependent Variables. The dependent variable in the Bayesian regressions measures firm performance. The annual ROA (return on assets) for the years 2000-2003 quantifies firm performance. The measure for ROA is the income before interest and tax, divided by total assets. This performance measure has a few advantages over other measures like ROS (return on sales) or ROE (return on equity). Harris and Helfat (1997) argue that using ROS has the disadvantage that sales decrease for poorly performing firms, and in the situation that sales

decrease by the same percentage of the profit, return on sales would stay equal. Furthermore, ROE is also less appropriate since firms have different degrees of total assets financed by equity (Harris and Helfat 1997). In the ex-post regressions, the dependent variables are the individual firm estimates $\beta_{1,i}$ and $\beta_{2,i}$ emerging from the Bayesian analysis in the first stage.

Independent Variables. In the Bayesian regressions, the independent variables are two demographic board variables: percentage of family directors on the board and board size. The study measures the percentage of family directors as the number of family members on the board divided by the total number of members on the board. The absolute number of board members measures board size, which varies between two and fourteen in the sample.

In the ex-post regression the service gap and the control gap are independent variables. The survey inquires into eleven board tasks identified by van den Heuvel et al. (2006) forming the basis of these two variables. Based on a principal component analysis on the boards' performance on these tasks, this study groups them into service and control tasks in a similar way as these authors do. Categorized as service tasks are the building of organizational reputation, formulating and ratifying organizational strategy, networking and maintaining relations, advising management, and taking care of access to external resources. Grouped as control tasks are the directing of succession problems, evaluating and controlling management performance, determining management's responsibility, maximizing shareholder value, determining the salary, compensation of the management, and selection of new managers. In the survey we asked the participating CEOs to indicate how much each task was needed and how the board performed on each task. A five-point Likert scale questions both the perceived need and performance of these board tasks. The difference between these two is calculated for each task and added up according to which group they belong to. In this way we quantify the overall gap on the service task and on the control task.

The Cronbach's α for the needs and task performance on the control and the service tasks range from 0.87 to 0.89, showing an acceptable level of internal consistency.

This study focuses on the gap that exists when board task needs exceed the actual board task performance. In this situation the needs of the firm for certain tasks are not fulfilled and a better score of the board on these tasks would have been beneficial for the firm. When the opposite occurs, that is, board task needs are less than board task performance, we interpret this situation as no gap and give these observations a score of 0. This coding is consistent with the concept of satisficing behavior (Cyert and March 1963).

Control Variables. Analogous to previous research on boards of directors this paper controls for industry type and firm and board characteristics. More specifically, in the Bayesian regressions, to estimate the effect of the number of family directors on firm performance ($\beta_{1,i}$), the control variables are CEO-duality, board size, industry, and year. For the second estimate, the effect of board size on firm performance ($\beta_{2,i}$), the study controls for CEO-duality, the percentage of family directors, industry, and year.

A dummy variable measures CEO-duality. Value one indicates that the CEO is also chairman of the board, whereas the value zero indicates that a different person occupies this position. Board size indicates the number of board members. The analysis controls for the industry effect by grouping the sample into four dummies based on the firm's SIC-codes: the primary, the construction, the wholesale, and the service industry. Four year dummies control for possible year effects. The number of family directors divided by the total number of board members measures the percentage of family directors.

The ex-post regression analysis controls for firm size, calculated as the natural log of the book value of total assets to correct for skewness. We also add the regularly used board behavior variable frequency of formal meetings of the board (Gabrielsson and Winlund 2000)

as a quadratic function to the control variables. The choice to include this as a quadratic function results from the idea that the frequency of meetings has a positive effect up to a saturation point where too many meetings occur and the effect turns negative. Hence, an increased frequency of meetings initially enhances board effectiveness and firm value (Brenes et al. 2011; Conger, Finegold, and Lawler 1998). However, board meetings are also costly and time-consuming implying that at a certain point extra board meetings are no longer value adding (Vafeas 1999).

Results

Resulting from the Bayesian analyses, Tables 1 and 2 summarize the estimation results and kernel-density graphs showing the distribution of the estimated individual firm coefficients $\beta_{1,i}$ and $\beta_{2,i}$. Table 1 shows that the average effect of the number of family directors on performance ($\beta_{1,i}$) is positive (0.8). However, the number of firms with a negative effect (45 percent) —indicated by the area under the curve that lies to the left of zero— almost equals the number of firms with a positive effect, shown by the area under the curve to the right of zero. Again, this result illustrates that the effect of the number of family directors on firm performance is different across small and medium-sized family firms which justifies the estimation of the effect at firm level.

Insert Table 1 about here

Table 2 indicates that the effect of board size on firm performance ($\beta_{2,i}$) is on average negative. The majority of firms from the sample also demonstrate a negative effect of board size on firm performance as the area to the left of zero includes about 77 percent of the sample, but still, a firm specific estimation provides the opportunity to take into account the variety in the sample.

Insert Table 2 about here

Table 3 reports summary statistics and correlation coefficients for the variables used in the ex-post regression.

Insert Table 3 about here

The correlation analysis shows no significant correlations among the independent variables. Additionally the highest variance inflation factor (VIF) value is 7.38, which is the value of the quadratic term of the frequency of board meetings. One can explain this higher value with the higher correlation with the first-degree variable of the frequency of board meetings. Other variables show VIF values between 1 and 2. These observations do not provide an indication of multicollinearity. The correlation between the service gap and the control gap is high (0.61). This high correlation is to be expected and is in line with previous findings by Minichilli et al. (2009) suggesting that boards that score high on the service tasks are also likely to perform well on the control tasks. The study tests the hypotheses in six models, presented in Table 4. All standard errors are robust to heteroscedasticity.

Insert Table 4 about here

In the first three models, the dependent variable is $\beta_{1,i}$, the effect of the number of family directors on firm performance. Models 4, 5, and 6 have $\beta_{2,i}$, the effect of board size on firm performance, as the dependent variable. The first model includes only the control variables of firm size and the frequency of formal meetings. In this model, coefficients are not significant and the F-statistic denotes joint insignificance of the model. The second model adds the size

of the service gap. The coefficient on the service gap is negative and statistically significant at the 0.01 level. This finding indicates that the smaller the gap between the board task needs and board task performance, the more positive or less negative the effect of family members on firm performance. The third model contains the two control variables and the size of the control gap. The coefficient on the control gap is again negative, but only marginally significant. The result suggests that the effect of family directors on firm performance is negatively related to the size of the control gap, which is in line with the second hypothesis.

In models 4, 5, and 6, the dependent variable is the effect of board size on firm performance. When adding only firm size and frequency of formal meetings as controls (model 4), the F-statistic denotes joint insignificance of the model. However, when adding the service gap (model 5) and control gap (model 6), the models become jointly significant. In Model 5, the coefficient of the service gap is again negative and now significant at the 0.01 level. This result accords with hypothesis 3: the effect of board size on firm performance is negatively related to the size of the service gap. Finally, the fourth hypothesis is marginally supported by the results. The coefficient estimate of the control gap in model 6 is negative and significant at a 10 percent level. The result suggests that the better the board fulfills its control task needs, the more positive or less negative the effect of board size on firm performance.

In sum, the influence of the service gap on the effect of the board demographic variables on firm performance finds strong statistical confirmation (H1a and H2a). The influence of the control gap on these effects is marginally supported (H1b and H2b). As a robustness check, we obtain similar results when keeping the variables service gap and control gap continuous, thus preserving the observations with needs lower than actual performance as negative figures.

Discussion and Conclusion

Contributions and Implications

The findings of this paper contribute to the understanding of the functioning of the board of directors in general and especially in the context of private small and medium-sized family firms. Based on the concept of satisficing behavior (Cyert and March 1963), this study illustrates the importance of incorporating board task needs and board task performance when formulating hypotheses on the effects of the number of family directors and board size on firm performance. Hence this paper proposes that the effects of both demographic variables on firm performance are dependent on the board's behavioral performance, measured in this study as the gap between the need for the board to perform its service and control tasks and the actual performance of the board on these tasks.

The empirical results suggest that the smaller the size of the service gap, the more positive or less negative the influence of the number of family directors and board size on firm performance. This result indicates that family directors have an enhancing effect on firm performance when they offer the firm sufficient service behavior in comparison to the firm's needs. Similarly, the smaller the gap between the need for the board to perform service tasks and the actual performance on these tasks, the better the effect of board size on firm performance. This study draws similar conclusions for the size of the gap between needs and actual performance of the board on the control tasks.

These findings show that not just actual board task performance is important; board task needs should be considered as well. A low task performance for certain board tasks does not necessarily need to have a negative influence on firm performance as long as the board task needs are equally low. Furthermore, the results of this study demonstrate that a specific board composition should not have the same impact on the performance for all firms. A reason for this could be that family firms are a heterogeneous group (Dyer 2006; Westhead and

Howorth 2007) and thus that the effect of family directors for one family firm is not necessarily the same for another family firm. Indeed, if in a family firm a large proportion of family directors increases the level of trust and cohesiveness in the board, their effect will likely be positive for the performance of this firm. However, if in another family firm the group of family directors is characterized by a high degree of relational conflict (Kidwell et al. 2012) their effect might be rather negative."

The same holds for the effect of board size; one corporate governance type does not necessarily fit for all firms (Huse 2005) suggesting that an ideal board size that holds for all firms does not likely exist. Therefore, a possible explanation for the inconclusive results for the relationship between board demography and firm performance (Daily et al. 2003) could be that a general positive or general negative influence of family directors or board size on board behavior or firm performance variables is hard to find. Although in governance literature, heterogeneity has been hinted at by Huse (2005), the idea that there is not one superior governance type for all firms deserves more attention. Taking into account board task needs when studying board behavior can be a step forward. That is, by comparing board task performance with the board task needs, we take into account that different firms have different board task needs and that different board behavior will be beneficial for different types of firms.

This study takes this idea of heterogeneity also into account in the empirical testing, by using a Bayesian methodology. This type of analysis allows for an estimation of the effects of the two demographic board variables on firm performance for each firm individually. Based on the positive and negative influences found for different firms, the paper demonstrates that this methodology has advantages when studying boards of directors in small and medium-sized family firms. Hence the results show the importance of Bayesian methodology for future board and family business research.

As a practical implication, we emphasize the importance of board task needs when evaluating board behavior. When installing a board of directors in family firms, family owners and the future board members should discuss and jointly formulate what service and control tasks are needed in the firm and how the board can answer to these needs. Afterwards, board evaluations should occur regularly so reflections on what the board is doing, compared to what is needed can be made. Research has acknowledged the importance of these board evaluations as they are instruments to improve the board's performance (Kiel, Nicholson, and Barclay 2005; Minichilli, Gabrielsson, and Huse 2007). Board evaluations should function as reflection/learning moments in which family owners and board members can determine the board tasks needs together and can formulate what is expected from each board member individually. Making these board task needs explicit might help board members to perform their tasks in accordance to what is needed in the family firm, enhancing the efficiency of the board.

Research Limitations and Future Research

This study is not without limitations which provides opportunities for future research. A first one is that only CEOs completed the survey. Although CEOs know their firm thoroughly and are therefore well positioned to complete the questionnaire, the possibility exists that the indicated need for the board to perform its service task and —probably even more important— the need for the board to control is biased by the CEOs' perception and preferences. In this regard Gabrielsson (2007) notes that chairpersons usually give higher scores on the board's involvement in service and control tasks than the CEO. Future research could therefore question multiple respondents per firm in order to provide additional support for the results of this paper. Nevertheless, Gabrielsson (2007) also advocates the advantage of having the CEO as the only respondent since this choice increases the probability of

participation and consequently sample size. Furthermore, in Belgium, the CEO is usually present at board meetings whether he or she is board member or not and thus well aware of what goes on in the board room.

Another limitation could be the fact that the sample in this paper consists of Belgian small and medium-sized firms only. However, selecting only Belgian firms provides the advantage of having accurate financial data on privately held firms obtained from the publicly available database Bel-First, which is uncommon in most countries. Furthermore, although board behavior is commonly studied using survey data (for example, Minichilli et al. 2012; Zona and Zattoni 2007), other methodologies, such as case studies, might provide additional benefits in studying this behavioral process.

Future research could investigate what happens over time when a gap between board task needs and board task performance occurs. When studying the evolution of this gap, other behavioral concepts might be interesting to explore. The needs towards board task performance could then be linked to the aspiration level (that is, the established goal for achievement) of the firm which one can compare to what this study defined as good enough in the context of satisficing behavior (Cyert and March 1963). If board task performance is equal to the aspiration level set by the firm, one would find no gap. This outcome is good as it poses no problem for the firm and board task performance would stay equal. However, if board task performance is below the aspiration level of the firm, problemistic search will occur (Cyert and March 1963). This concept implies the search for alternative strategic behavior which would align the performance with the aspiration level (Greve 2008; Ketchen and Palmer 1999). In the context of this study, this situation would imply that the board would search for alternative behavior, in this case, move their attention towards tasks that are more important for the firm than the ones they performed in the past, or the board could simply increase their efforts in general. In this case, the gap between board task needs and

board task performance decreases, which is beneficial (Huse 2005). Whereas current literature studies these concepts in the context of firm performance, further theoretical development and empirical testing could investigate how aspiration levels and problemistic search relate to board task performance.

Future studies could also include process variables identified by recent studies of, for example van Ees et al. (2008) or Minichilli et al. (2009), and investigate how board processes influence the gap between board task needs and board task performance. The effect of the service and control gap on the relationship between other demographic board variables, such as the percentage of independent directors or CEO-duality, and firm performance, can also be subject to further research. Also, the role of more personal characteristics of board members, such as gender and their tenure could be interesting for future research. More specifically, gender diversity in the board is found to positively influence firm performance (for example, Campbell and Mínguez-Vera 2009) as well as to have a more negative influence (for example, Wellalage and Locke in press). Similarly, conflicting views also exist regarding the effect of director tenure on firm performance (Vafeas 2003). Therefore, incorporating the size of the service and the control gap might clarify the diverging findings on the relationship between these board demographics ―gender diversity and director tenure― and firm performance.

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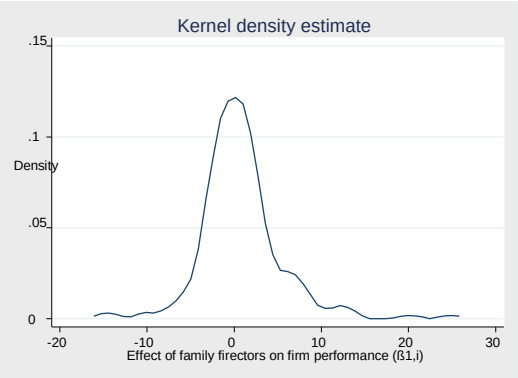
Table 1
Mean, Standard Deviation, Minimum, Maximum and Kernel Density[a]

$\beta_{1,i}$

Effect of Percentage of Family Directors on Firm Performance

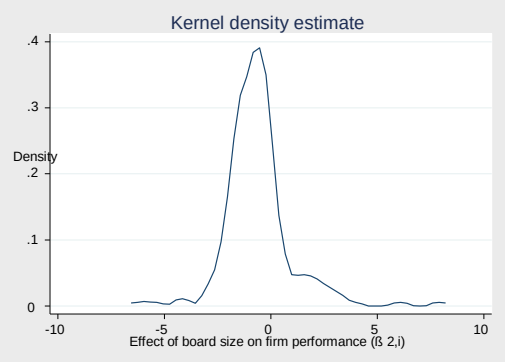
Mean	0.8
Standard Deviation	4.63
Minimum	-15.16
Maximum	24.90



[a] $N = 201$

Table 2
Mean, Standard Deviation, Minimum, Maximum and Kernel Density[a]

	$\beta_{2,i}$
	Effect of Board Size of Firm Performance
Mean	-0.6
Standard Deviation	1.55
Minimum	-6.27
Maximum	7.92



[a] $N = 201$

Table 3
Correlation Matrix, Means and Standard Deviations[a]

Variable	Mean	SD	1	2	3	4	5	6
1. $\beta_{1,i}$	0.8	4.63	1					
2. $\beta_{2,i}$	-0.6	1.55	0.98**	1				
3. Service Gap	1.9	2.61	-0.17*	-0.16*	1			
4. Control Gap	2.3	3.42	-0.10	-0.09	0.61**	1		
5. Size	7.5	1.16	0.09	0.05	0.14*	0.01	1	
6. Freq. Formal Meetings	3.8	6.39	-0.04	-0.04	0.06	-0.03	0.09	1

[a] $N = 201$, †: $p < 0.10$, *: $p < 0.05$, **: $p < 0.01$

Table 4
Results of Regression Analyses[a]

	Effect Number of Family Directors on Firm Performance			Effect Board Size on Firm Performance		
Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**	**Model 5**	**Model 6**
Controls:						
Firm Size	0.37	0.47†	0.38	0.08	0.11	0.08
	(0.25)	(0.24)	(0.25)	(0.08)	(0.08)	(0.08)
Frequency of Formal Meetings	0.01	0.00	0.01	0.00	-0.00	0.00
	(0.11)	(0.11)	(0.11)	(0.04)	(0.04)	(0.04)
(Frequency of Formal Meetings)^2	-0.00	-0.00	-0.00	-0.00	-0.00	-0.00
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
Independent Variable:						
Service Gap		-0.31**			-0.10 **	
		(0.09)			(0.03)	
Control Gap			-0.14†			-0.04†
			(0.08)			(0.03)
R^2	0.01	0.04	0.03	0.01	0.03	0.01
F	2.31†	5.53**	2.79*	1.60	4.29**	2.15†

[a] N= 201, †: $p < 0.10$, *: $p < 0.05$, **: $p < 0.01$